

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

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Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al.; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

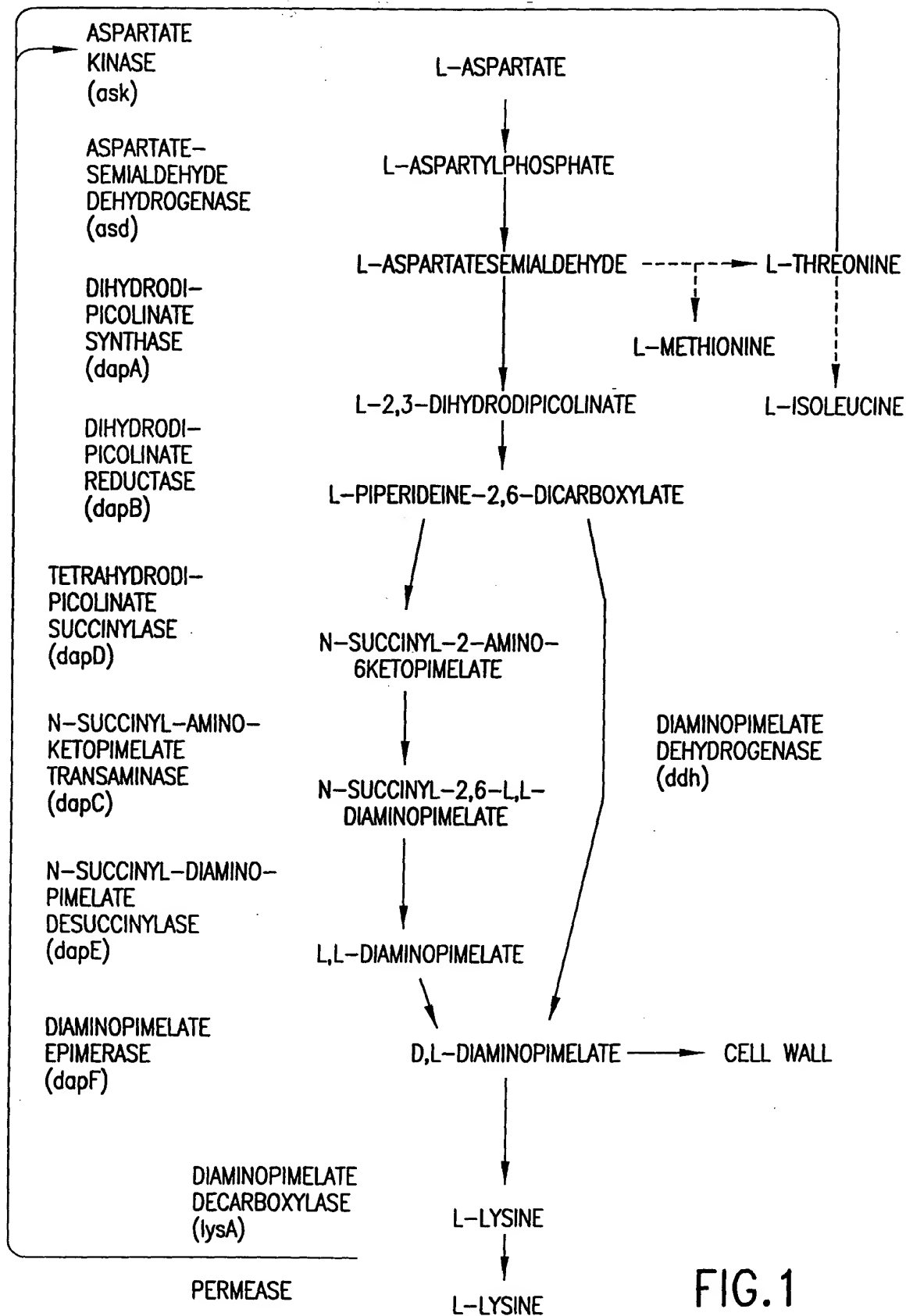


FIG.1

APPROVED	O.G. FIG.
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Title: Increased Lysine Production by Gene Amplification

Nucleotide sequence of ATCC21529 ask (SEQ ID NO:1)

```

1  GTGGCCCTGG TCGTACAGAA ATATGGCGGT TCCTCGCTTG AGAGTGCGGA
51  ACGCATTAGA AACGTCGCTG AACGGATCGT TGCCACCAAG AAGGCTGGAA
101 ATGATGTCGT GGTGTCTGCTGCCAATGG GAGACACCAC GGATGAACTT
151 CTAGAACTTG CAGCGGCAGT GAATCCCGTT CCGCCAGCTC GTGAAATGGA
201 TATGCTCCTG ACTGCTGGTG AGCGTATTTT TAACGCTCTC GTCGCCATGG
251 CTATTGAGTC CCTTGGCGCA GAAGCTCAAT CTTTCACTGG CTCTCAGGCT
301 GGTGTGCTCA CCACCGAGCG CCACGGAAAC GCACGCATTG TTGACGTCAC
351 ACCGGGTCGT GTGCGTGAAG CACTCGATGA GGGCAAGATC TGCATTGTTG
401 CTGGTTTTCA GGGTGTTAAT AAAGAAACCC GCGATGTCAC CACGTTGGGT
451 CGTGGTGGTT CTGACACCAC TGCAGTTGCG TTGGCAGCTG CTTTGAACGC
501 TGATGTGTGT GAGATTTACT CGGACGTTGA CGGTGTGTAT ACCGCTGACC
551 CGCGCATCGT TCCTAATGCA CAGAAGCTGG AAAAGCTCAG CTTCAAGAA
601 ATGCTGGAAC TTGCTGCTGT TGGCTCCAAG ATTTTGGTGC TGCGCAGTGT
651 TGAATACGCT CGTGCATTCA ATGTGCCACT TCGCGTACGC TCGTCTTATA
701 GTAATGATCC CGGCACTTTG ATTGCCGGCT CTATGGAGGA TATTCCTGTG
751 GAAGAAGCAG TCCTTACCGG TGTCGCAACC GACAAGTCCG AAGCCAAAGT
801 AACCGTTCTG GGTATTTCCG ATAAGCCAGG CGAGGCTGCC AAGGTTTTCC
851 GTGCGTTGGC TGATGCAGAA ATCAACATTG ACATGGTTCT GCAGAAcgtc
901 tcctctgtGG AAGACGGCAC CACCGACATC ACGTTCACCT GCCCTCGCGC
951 TGACGGACGC CGTGCGATGG AGATCTTGAA GAAGCTTCAG GTTCAGGGCA
1001 ACTGGACCAA TGTGCTTTAC GACGACCAGG TCGGCAAAGT CTCCTCGTG
1051 GGTGCTGGCA TGAAGTCTCA CCCAGGTGTT ACCGCAGAGT TCATGGAAGC
1101 TCTGCGCGAT GTCAACGTGA ACATCGAATT GATTTCCATC TCTGAGATCC
1151 GCATTTCCGT GCTGATCCGT GAAGATGATC TGGATGCTGC TGCACGTGCA
1201 TTGCATGAGC AGTTCCAGCT GGGCGGCGAA GACGAAGCCG TCGTTTATGC
1251 AGGCACCGGA CGCTAA

```

FIG. 2

APPROVED	C.G. FIG.	
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Amino Acid Sequence of ATTC21529 ask (SEQ ID NO:2)

```

1  GTGGCCCTGGTCGTACAGAAATATGGCGGTTCTCGCTTGAGAGTGCGGAACGCATTAGA 60
   M A L V V Q K Y G G S S L E S A E R I R
61  AACGTCGCTGAACGGATCGTTGCCACCAAGAAGGCTGGAAATGATGTCGTGGTTGTCTGC 120
   N V A E R I V A T K K A G N D V V V V C
121 TCCGCAATGGGAGACACCACGGATGAACTTCTAGAACTTGCAGCGGCAGTGAATCCCGTT 180
   S A M G D T T D E L L E L A A A V N P V
   CCGCCAGCTCGTGAAATGGATATGCTCCTGACTGCTGGTGAGCGTATTTCTAACGCTCTC
181 -----+-----+-----+-----+-----+-----+ 240
   P P A R E M D M L L T A G E R I S N A L
   GTCGCCATGGCTATTGAGTCCCTTGGCGCAGAAGCTCAATCTTTCACTGGCTCTCAGGCT
241 -----+-----+-----+-----+-----+-----+ 300
   V A M A I E S L G A E A Q S F T G S Q A
   GGTGTGCTCACCACCGAGCGCCACGGAACGCACGCATTGTTGACGTCACACGGGGTCGT
301 -----+-----+-----+-----+-----+-----+ 360
   G V L T T E R H G N A R I V D V T P G R
   GTGCGTGAAGCACTCGATGAGGGCAAGATCTGCATTGTTGCTGGTTTTACGGGTGTTAAT
361 -----+-----+-----+-----+-----+-----+ 420
   V R E A L D E G K I C I V A G F Q G V N
   AAAGAAACCCGCGATGTCACCACGTTGGGTCGTGGTGGTTCTGACACCACTGCAGTTGCG
421 -----+-----+-----+-----+-----+-----+ 480
   K E T R D V T T L G R G G S D T T A V A
   TTGGCAGCTGCTTTGAACGCTGATGTGTGTGAGATTTACTCGGACGTTGACGGTGTGTAT
481 -----+-----+-----+-----+-----+-----+ 540
   L A A A L N A D V C E I Y S D V D G V Y
   ACCGCTGACCCGCGCATCGTTCCTAATGCACAGAAGCTGGAAAAGCTCAGCTTCGAAGAA
541 -----+-----+-----+-----+-----+-----+ 600
   T A D P R I V P N A Q K L E K L S F E E
   ATGCTGGAACCTTGCTGCTGTTGGCTCCAAGATTTTGGTGCTGCGCAGTGTGAATACGCT
601 -----+-----+-----+-----+-----+-----+ 660
   M L E L A A V G S K I L V L R S V E Y A

```

FIG.3A

APPROVED	O. G. FIG.
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```

661 CGTGCATTCAATGTGCCACTTCGCGTACGCTCGTCTTATAGTAATGATCCCGGCACTTTG
-----+-----+-----+-----+-----+-----+ 720
    R A F N V P L R V R S S Y S N D P G T L
721 ATTGCCGGCTCTATGGAGGATATTCCTGTGGAAGAAGCAGTCCTTACCGGTGTCGCAACC
-----+-----+-----+-----+-----+-----+ 780
    I A G S M E D I P V E E A V L T G V A T
781 GACAAGTCCGAAGCCAAAGTAACCGTTCTGGGTATTTCCGATAAGCCAGGCGAGGCTGCC
-----+-----+-----+-----+-----+-----+ 840
    D K S E A K V T V L G I S D K P G E A A
841 AAGGTTTTCCGTGCGTTGGCTGATGCAGAAATCAACATTGACATGGTTCTGCAGAAcgtc
-----+-----+-----+-----+-----+-----+ 900
    K V F R A L A D A E I N I D M V L Q N V
    tcctctgtGGAAGACGGCACCACCGACATCACGTTACCTGCCCTCGCGCTGACGGACGC
901 -----+-----+-----+-----+-----+-----+ 960
    S S V E D G T T D I T F T C P R A D G R
    CGTGCGATGGAGATCTTGAAGAAGCTTCAGGTTCAAGGGCAACTGGACCAATGTGCTTTAC
961 -----+-----+-----+-----+-----+-----+ 1020
    R A M E I L K K L Q V Q G N W T N V L Y
    GACGACCAGGTCGGCAAAGTCTCCCTCGTGGGTGCTGGCATGAAGTCTCACCCAGGTGTT
1021 -----+-----+-----+-----+-----+-----+ 1080
    D D Q V G K V S L V G A G M K S H P G V
    ACCGCAGAGTTCATGGAAGCTCTGCGCGATGTCAACGTGAACATCGAATTGATTTCCATC
1081 -----+-----+-----+-----+-----+-----+ 1140
    T A E F M E A L R D V N V N I E L I S I
    TCTGAGATCCGCATTTCCGTGCTGATCCGTGAAGATGATCTGGATGCTGCTGCACGTGCA
1141 -----+-----+-----+-----+-----+-----+ 1200
    S E I R I S V L I R E D D L D A A A R A
    TTGCATGAGCAGTTCAGCTGGGCGGCGAAGACGAAGCCGTCGTTTATGCAGGCACCGGA
1201 -----+-----+-----+-----+-----+-----+ 1260
    L H E Q F Q L G G E D E A V V Y A G T G
    CGCTAA
1261 ----- 1266
    R *
```

FIG.3B

APPROVED	O.G. FIG.
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Nucleotide sequence of ATCC21529 asd (SEQ ID NO:3)

```

1  ATGACCACCA TCGCAGTTGT TGGTGCAACC GGCCAGGTCG GCCAGGTTAT
51  GCGCACCTTT TTGGAAGAGC GCAATTTCCC AGCTGACACT GTTCGTTTCT
101 TTGCTTCCCC GCGTTCGCA GGCCGTAAGA TTGAATTCCG TGGCACGGAA
151 ATCGAGGTAG AAGACATTAC TCAGGCAACC GAGGAGTCCC TCAAGGGCAT
201 CGACGTTGCG TTGTTCTCTG CTGGAGGCAC CGCTTCCAAG CAGTACGCTC
251 CACTGTTTGC TGCTGCAGGC GCGACTGTTG TGGATAACTC TTCTGCTTGG
301 CGCAAGGACG ACGAGGTTCC ACTAATCGTC TCTGAGGTGA ACCCTTCCGA
351 CAAGGATTCC CTGGTCAAGG GCATTATTGC GAATCCTAAC TGCACCACCA
401 TGGCTGCAAT GCCAGTGCTG AAGCCACTGC ACGATGCCGC TGGTCTTGTA
451 AAGCTTCACG TTTCTCTTA CCAGGCTGTT TCCGGTCTG GTCTTGCAAG
501 TGTGGAAACC TTGGCAAAGC AGGTTGCTGC AGTTGGCGAC CACAACGTTG
551 AGTTCGTCCA TGATGGACAG GCTGCTGACG CAGGCGATGT CGGACCTTAC
601 GTTTCCCCAA TCGCTTACAA CGTGCTGCCA TTCGCCGAA ACCTCGTCGA
651 TGACGGCACC TTCGAAACCG ACGAAGAGCA GAAGCTGCGC AACGAATCCC
701 GCAAGATTCT CGGCCTCCCA GACCTCAAGG TCTCAGGCAC CTGCGTCCGC
751 GTGCCGTTT TCACCGGCCA CACGCTGACC ATTCACGCCG AATTCGACAA
801 GGCAATCACC GTCGAGCAGG CGCAGGAGAT CTTGGGTGCC GCTTCAGGCG
851 TCGAGCTTGT CGACGTCCCA ACCCACTTG CAGCTGCCGG CATTGACGAA
901 TCCCTCGTTG GACGCATCCG TCAGGACTCC ACTGTCGACG ACAACCGCGG
951 TCTGGTTCTC GTCGTATCTG GCGATAACCT TCGCAAGGGC GCAGCACTGA
1001 ACACCATTCA GATTGCTGAG CTGCTGGTTA AGTAA

```

FIG. 4

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Amino acid sequence of ATCC21529 asd (SEQ ID NO:4)

```

1  ATGACCACCATCGCAGTTGTTGGTGAACCGGCCAGGTCGGCCAGGTTATGCGCACCTTT
   .....+.....+.....+.....+.....+.....+.....+ 60
   M T T I A V V G A T G Q V G Q V M R T F
   TTGGAAGAGCGCAATTTCCCAGCTGACACTGTTTCGTTTCTTTGCTTCCCCGCGTTCCGCA
61 .....+.....+.....+.....+.....+.....+.....+ 120
   L E E R N F P A D T V R F F A S P R S A
   GGCCGTAAGATTGAATTCCGTGGCACGGAAATCGAGGTAGAAGACATTACTCAGGCAACC
121 .....+.....+.....+.....+.....+.....+.....+ 180
   G R K I E F R G T E I E V E D I T Q A T
   GAGGAGTCCCTCAAGGGCATCGACGTTGCGTTGTTCTCTGCTGGAGGCACCGCTTCCAAG
181 .....+.....+.....+.....+.....+.....+.....+ 240
   E E S L K G I D V A L F S A G G T A S K
   CAGTACGCTCCACTGTTTGCTGCTGCAGGCGCGACTGTTGTGGATAACTCTTCTGCTTGG
241 .....+.....+.....+.....+.....+.....+.....+ 300
   Q Y A P L F A A A G A T V V D N S S A W
   CGCAAGGACGACGAGGTTCCACTAATCGTCTCTGAGGTGAACCCCTCCGACAAGGATTCC
301 .....+.....+.....+.....+.....+.....+.....+ 360
   R K D D E V P L I V S E V N P S D K D S
   CTGGTCAAGGGCATTATTGCGAATCCTAACTGCACCACCATGGCTGCAATGCCAGTGCTG
361 .....+.....+.....+.....+.....+.....+.....+ 420
   L V K G I I A N P N C T T M A A M P V L
   AAGCCACTGCACGATGCCGCTGGTCTTGTAAGCTTCACGTTTCTCTTACCAGGCTGTT
421 .....+.....+.....+.....+.....+.....+.....+ 480
   K P L H D A A G L V K L H V S S Y Q A V
   TCCGGTTCTGGTCTTGCAAGGTGTGGAAACCTTGGCAAAGCAGGTTGCTGCAGTTGGCGAC
481 .....+.....+.....+.....+.....+.....+.....+ 540
   S G S G L A G V E T L A K Q V A A V G D

```

FIG.5A

APPROVED	O.G. FIG.
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Appl. No. 09/722,441; Group Art Unit: 1645
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Title: Increased Lysine Production by Gene Amplification

```

541 CACAACGTTGAGTTCGTCCATGATGGACAGGCTGCTGACGCAGGCGATGTCGGACCTTAC
-----+-----+-----+-----+-----+-----+ 600
      H N V E F V H D G Q A A D A G D V G P Y
601 GTTTCCTCCCAATCGCTTACAACGTGCTGCCATTGCGCCGGAACCTCGTCGATGACGGCACC
-----+-----+-----+-----+-----+-----+ 660
      V S P I A Y N V L P F A G N L V D D G T
661 TTCGAAACCGACGAAGAGCAGAAGCTGCGCAACGAATCCCGCAAGATTCTCGGCCTCCCA
-----+-----+-----+-----+-----+-----+ 720
      F E T D E E Q K L R N E S R K I L G L P
721 GACCTCAAGGTCTCAGGCACCTGCGTCCGCGTGCCGGTTTTTCACCGGCCACACGCTGACC
-----+-----+-----+-----+-----+-----+ 780
      D L K V S G T C V R V P V F T G H T L T
781 ATTCACGCCGAATTCGACAAGGCAATCACCGTCGAGCAGGCGCAGGAGATCTTGGGTGCC
-----+-----+-----+-----+-----+-----+ 840
      I H A E F D K A I T V E Q A Q E I L G A
841 GCTTCAGGCGTCGAGCTTGTCGACGTCCCAACCCCACTTGACGCTGCCGGCATTGACGAA
-----+-----+-----+-----+-----+-----+ 900
      A S G V E L V D V P T P L A A A G I D E
901 TCCCTCGTTGGACGCATCCGTCAGGACTCCACTGTCGACGACAACCGCGGTCTGGTTCTC
-----+-----+-----+-----+-----+-----+ 960
      S L V G R I R Q D S T V D D N R G L V L
961 GTCGTATCTGGCGATAACCTTCGCAAGGGCGCAGCACTGAACACCATTGAGATTGCTGAG
-----+-----+-----+-----+-----+-----+ 1020
      V V S G D N L R K G A A L N T I Q I A E
1021 CTGCTGGTTAAGTAA
-----+----- 1035
      L L V K *

```

FIG.5B

APPROVED	O.G. FIG.	
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Inventor(s): Hanke et al.; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Nucleotide sequence of dapA (SEQ ID NO:5)

```

1  ATGAGCACAG GTTTAACAGC TAAGACCGGA GTAGAGCACT TCGGCACCGT
51  TGGAGTAGCA ATGGTTACTC CATTACGGA ATCCGGAGAC ATCGATATCG
101 CTGCTGGCCG CGAAGTCGCG GCTTATTTGG TTGATAAGGG CTTGGATTCT
151 TTGGTTCTCG CGGGCACCAC TGGTGAATCC CCAACGACAA CCGCCGCTGA
201 AAAACTAGAA CTGCTCAAGG CCGTTCGTGA GGAAGTTGGG GATCGGGCGA
251 AGCTCATCGC CGGTGTCGGA ACCAACAACA CGCGGACATC TGTGGAACCT
301 GCGGAAGCTG CTGCTTCTGC TGGCGCAGAC GGCTTTTAG TTGTAACCTC
351 TTATTACTCC AAGCCGAGCC AAGAGGGATT GCTGGCGCAC TTCGGTGCAA
401 TTGCTGCAGC AACAGAGGTT CCAATTTGTC TCTATGACAT TCCTGGTCGG
451 TCAGGTATTC CAATTGAATC TGATACCATG AGACGCCTGA GTGAATTACC
501 TACGATTTTG GCGGTCAAGG ACGCCAAGGG TGACCTCGTT GCAGCCACGT
551 CATTGATCAA AGAAACGGGA CTTGCCTGGT ATTCAGGCGA TGACCCACTA
601 AACCTTGTTT GGCTTGCTTT GGGCGGATCA GGTTTCATTT CCGTAATTGG
651 ACATGCAGCC CCCACAGCAT TACGTGAGTT GTACACAAGC TTCGAGGAAG
701 GCGACCTCGT CCGTGCGCGG GAAATCAACG CCAAACATC ACCGCTGGTA
751 GCTGCCCAAG GTCGCTTGGG TGGAGTCAGC TTGGCAAAAG CTGCTcTGCG
801 TCTGCAGGGC ATCAACGTAG GAGATCCTCG ACTTCCAATT ATGGCTCCAA
851 ATGAGCAGGA ACTTGAGGCT CTCCGAGAAG ACATGAAAAA AGCTGGAGTT
901 CTATAA

```

FIG. 6

APPROVED	O.G. FIG.	
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Amino acid sequence of dapA (SEQ ID NO:6)

```

ATGAGCACAGGTTTAAACAGCTAAGACCGGAGTAGAGCACTTCGGCACCGTTGGAGTAGCA
1  -----+-----+-----+-----+-----+-----+ 60
M S T G L T A K T G V E H F G T V G V A

ATGGTTACTCCATTCACGGAATCCGGAGACATCGATATCGCTGCTGGCCGCGAAGTCGCG
61  -----+-----+-----+-----+-----+-----+ 120
M V T P F T E S G D I D I A A G R E V A

GCTTATTTGGTTGATAAGGGCTTGGATTCTTTGGTTCTCGCGGGCACCCTGGTGAATCC
121 -----+-----+-----+-----+-----+-----+ 180
A Y L V D K G L D S L V L A G T T G E S

CCAACGACAACCGCCGCTGAAAACTAGAACTGCTCAAGGCCGTTCTGTAGGAAGTTGGG
181 -----+-----+-----+-----+-----+-----+ 240
P T T T A A E K L E L L K A V R E E V G

GATCGGGCGAAGCTCATCGCCGGTGTGGAACCAACAACACGCGGACATCTGTGGAAGTT
241 -----+-----+-----+-----+-----+-----+ 300
D R A K L I A G V G T N N T R T S V E L

GCGGAAGCTGCTGCTTCTGCTGGCGCAGACGGCCTTTTAGTTGTAACCTCTTATTACTCC
301 -----+-----+-----+-----+-----+-----+ 360
A E A A A S A G A D G L L V V T P Y Y S

AAGCCGAGCCAAGAGGGATTGCTGGCGCACTTCGGTGCAATTGCTGCAGCAACAGAGGTT
361 -----+-----+-----+-----+-----+-----+ 420
K P S Q E G L L A H F G A I A A A T E V

CCAATTTGTCTCTATGACATTCCTGGTCGGTCAGGTATTCCAATTGAATCTGATACCATG
421 -----+-----+-----+-----+-----+-----+ 480
P I C L Y D I P G R S G I P I E S D T M

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FIG.7A

APPROVED	O.G. FIG.
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```

AGACGCCTGAGTGAATTACCTACGATTTTGGCGGTCAAGGACGCCAAGGGTGACCTCGTT
481 -----+-----+-----+-----+-----+-----+ 540
      R R L S E L P T I L A V K D A K G D L V

GCAGCCACGTCATTGATCAAAGAAACGGGACTTGCCTGGTATTCAGGCGATGACCCACTA
541 -----+-----+-----+-----+-----+-----+ 600
      A A T S L I K E T G L A W Y S G D D P L

AACCTTGTTTGGCTTGCTTTGGGCGGATCAGGTTTCATTTCCGTAATTGGACATGCAGCC
601 -----+-----+-----+-----+-----+-----+ 660
      N L V W L A L G G S G F I S V I G H A A

CCCACAGCATTACGTGAGTTGTACACAAGCTTCGAGGAAGGCGACCTCGTCCGTGCGCGG
661 -----+-----+-----+-----+-----+-----+ 720
      P T A L R E L Y T S F E E G D L V R A R

GAAATCAACGCCAAACTATCACCGCTGGTAGCTGCCCAAGGTCGCTTGGGTGGAGTCAGC
721 -----+-----+-----+-----+-----+-----+ 780
      E I N A K L S P L V A A Q G R L G G V S

TTGGCAAAAGCTGCTctGCGTCTGCAGGGCATCAACGTAGGAGATCCTCGACTTCCAATT
781 -----+-----+-----+-----+-----+-----+ 840
      L A K A A L R L Q G I N V G D P R L P I

ATGGCTCCAAATGAGCAGGAACTTGAGGCTCTCCGAGAAGACATGAAAAAAGCTGGAGTT
841 -----+-----+-----+-----+-----+-----+ 900
      M A P N E Q E L E A L R E D M K K A G V

CTATAA
901 ----- 906
      L * -

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FIG.7B

APPROVED	O.G. FIG.
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Nucleotide sequence of dapB (SEQ ID NO:7)

```

1  ATGGGAATCA AGGTTGGCGT TCTCGGAGCC AAAGGCCGTG TTGGTCAAAC
51  TATTGTGGCA GCAGTCAATG AGTCCGACGA TCTGGAGCTT GTTGCAGAGA
101 TCGGCGTCGA CGATGATTTG AGCCTTCTGG TAGACAACGG CGCTGAAGTT
151 GTCGTTGACT TCACCACTCC TAACGCTGTG ATGGGCAACC TGGAGTTCTG
201 CATCAACAAC GGCATTTCTG CGGTTGTTGG AACCACGGGC TTCGATaATG
251 CTCGTTTGA GCAGGTTGCG GcCTGGCTTG AAGGAAAAGA CAATGTCGGT
301 GTTCTGATCG CACCTAACTT TGCTATCTCT GCGGTGTTGA CCATGGTCTT
351 TTCCAAGCAG GCTGCCCGCT TCTTCGAATC AGCTGAAGTT ATTGAGCTGC
401 ACCACCCCAA CAAGCTGGAT GCACCTTCAG GCACCGCGAT CCACACTGCT
451 CAGGGCATTG CTGCGGCACG CAAAGAAGCA GGCATGGACG CACAGCCAGA
501 TGCGACCGAG CAGGCACTTG AGGGTTCCCG TGGCGCAAGC GTAGATGGAA
551 TCCCAGTTCA cGCAGTCCGC ATGTCCGGCA TGGTTGCTCA CGAGCAAGTT
601 ATCTTTGGCA CCCAGGGTCA GACCTTGACC ATCAAGCAGG ACTCCTATGA
651 TCGCAACTCA TTTGCACCAG GTGTCTTGGT GGGTGTGCGC AACATTGCAC
701 AGCACCCAGG CCTAGTCGTA GGACTTGAGC ATTACCTAGG CCTGTAA

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FIG. 8

APPROVED	O.G. FIG.	
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Amino acid sequence of dapB (SEQ ID NO:8)

```

ATGGAATCAAGGTTGGCGTTCTCGGAGCCAAAGGCCGTGTTGGTCAAACCTATTGTGGCA
1  -----+-----+-----+-----+-----+-----+ 60
M G I K V G V L G A K G R V G Q T I V A

GCAGTCAATGAGTCCGACGATCTGGAGCTTGTTGCAGAGATCGGCGTCGACGATGATTG
61  -----+-----+-----+-----+-----+-----+ 120
A V N E S D D L E L V A E I G V D D D L

AGCCTTCTGGTAGACAACGGCGCTGAAGTTGTCGTTGACTTCACCACTCCTAACGCTGTG
121  -----+-----+-----+-----+-----+-----+ 180
S L L V D N G A E V V V D F T T P N A V

ATGGGCAACCTGGAGTTCTGCATCAACAACGGCATTCTGCGGTTGTTGGAACCACGGGC
181  -----+-----+-----+-----+-----+-----+ 240
M G N L E F C I N N G I S A V V G T T G

TTCGATaATGCTCGTTTGGAGCAGGTTGCGGcCTGGCTTGAAGGAAAAGACAATGTCGGT
241  -----+-----+-----+-----+-----+-----+ 300
F D N A R L E Q V R A W L E G K D N V G

GTTCTGATCGCACCTAACTTTGCTATCTCTGCGGTGTTGACCATGGTCTTTTCCAAGCAG
301  -----+-----+-----+-----+-----+-----+ 360
V L I A P N F A I S A V L T M V F S K Q

GCTGCCCGCTTCTTGAATCAGCTGAAGTTATTGAGCTGCACCACCCCAACAAGCTGGAT
361  -----+-----+-----+-----+-----+-----+ 420
A A R F F E S A E V I E L H H P N K L D

```

FIG.9A

APPROVED	O.G. FIG.	
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GCACCTTCAGGCACCGCGATCCACACTGCTCAGGGCATTGCTGCGGCACGCAAAGAAGCA
421 -----+-----+-----+-----+-----+-----+ 480

A P S G T A I H T A Q G I A A A R K E A

GGCATGGACGCACAGCCAGATGCGACCGAGCAGGCACTTGAGGGTTCCTCGTGGCGCAAGC
481 -----+-----+-----+-----+-----+-----+ 540

G M D A Q P D A T E Q A L E G S R G A S

GTAGATGGAATCCCAGTTCAcGCAGTCCGCATGTCCGGCATGGTTGCTCACGAGCAAGTT
541 -----+-----+-----+-----+-----+-----+ 600

V D G I P V H A V R M S G M V A H E Q V

ATCTTTGGCACCCAGGGTCAGACCTTGACCATCAAGCAGGACTCCTATGATCGCAACTCA
601 -----+-----+-----+-----+-----+-----+ 660

I F G T Q G Q T L T I K Q D S Y D R N S

TTTGCACCAGGTGTCTTGGTGGGTGTGCGCAACATTGCACAGCACCCAGGCCTAGTCGTA
661 -----+-----+-----+-----+-----+-----+ 720

F A P G V L V G V R N I A Q H P G L V V

GGACTTGAGCATTACCTAGGCCTGTAA
721 -----+-----+----- 747

G L E H Y L G L *

```

FIG.9B

APPROVED	O.G. FIG.
BY	CLASS
DRAFTSMAN	SUBCLASS

Sheet 14 of 36

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al.; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Nucleotide sequence of ddh (SEQ ID NO:9)

```

1  ATGCATTTTCG GTAAGCTCGA CCAGGACAGT GCCACCACAA TTTTGGAGGA
51  TTACAAGAAC ATGACCAACA TCCGCGTAGC TATCGTaGGC TACGGAAACC
101 TGGGACGCAG CGTCGAAAAG CTTATTGCCA AGCAGCCCGA CATGGACCTT
151 GTAGGAATCT TCTCGCGCCG GGCCACCCTC GACACAAAGA CGCCAGTCTT
201 TGATGTCGCC GACGTGGACA AGCACGCCGA CGACGTGGAC GTGCTGTTCC
251 TGTGCATGGG CTCCGCCACC GACATCCCTG AGCAGGCACC AAAGTTCGCG
301 CAGTTCGCCT GCACCGTAGA CACCTACGAC AACCACCGCG ACATCCCACG
351 CCACCGCCAG GTCATGAACG AAGCCGCCAC CGCAGCCGGC AACGTTGCAC
401 TGGTCTCTAC CGGCTGGGAT CCAGGAATGT TCTCCATCAA CCGCGTCTAC
451 GCAGCGGCAG TCTTAGCCGA GCACCAGCAG CACACCTTCT GGGGCCCAGG
501 TTTGTCACAG GGCCACTCCG ATGCTTTGCG ACGCATCCCT GGC GTTCAAA
551 AGGCcGTCCA GTACACCCTC CCATCCGAAG AaGCCCTGGA AAAGGCCCGC
601 CGTGCGGAAG CCGGCGACCT cACCGGAAAG CAAACCCACA AGCGCCAATG
651 CTTCTGTGGT GCCGACGCGG CCGAcCACGA GCGCATCGAA AACGACATCC
701 GCACCATGCC TGATTACTTC GTTGGCTACG AAGTCGAAGT CAACTTCATC
751 GACGAAGCAA CCTTgGACgC CGAGCACACC GGCATGCCAC ACGGcGGaCA
801 CGTGATcACC ACCGGCGACA CCGGTGGCTT CAACCACACC GTGGAATACA
851 TCCTgAAGCT GGACCGAAAC CCAGATTTCA CCGCTTctTC ACAGATCGCT
901 TTCGgcCGCG CAGCTCACCG CATGAAGCAG CAGGGCCAAA GCGGtGCTTT
951 CACCGTCCTC GAAGTTGCTC CATActTGCT CTCCCCgGAG AACTTGGAtG
1001 ATCTGATCGC ACGCGACGTC TAA

```

FIG. 10

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al. ; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Amino acid sequence of ddh (SEQ ID NO:10)

```

1  ATGCATTTTCGGTAAGCTCGACCAGGACAGTGCCACCACAATTTTGGAGGATTACAAGAAC
   -----+-----+-----+-----+-----+-----+ 60
   M H F G K L D Q D S A T T I L E D Y K N

61  ATGACCAACATCCGCGTAGCTATCGTaGGCTACGGAAACCTGGGACGCAGCGTCGAAAAG
   -----+-----+-----+-----+-----+-----+ 120
   M T N I R V A I V G Y G N L G R S V E K

121 CTTATTGCCAAGCAGCCGACATGGACCTTGTAGGAATCTTCTCGCGCCGGGCCACCCTC
   -----+-----+-----+-----+-----+-----+ 180
   L I A K Q P D M D L V G I F S R R A T L

181 GACACAAAGACGCCAGTCTTTGATGTCGCCGACGTGGACAAGCACGCCGACGACGTGGAC
   -----+-----+-----+-----+-----+-----+ 240
   D T K T P V F D V A D V D K H A D D V D

241 GTGCTGTTCTGTGCATGGGCTCCGCCACCGACATCCCTGAGCAGGCACCAAAGTTCGCG
   -----+-----+-----+-----+-----+-----+ 300
   V L F L C M G S A T D I P E Q A P K F A

301 CAGTTCGCCTGCACCGTAGACACCTACGACAACCACCGCGACATCCCACGCCACCGCCAG
   -----+-----+-----+-----+-----+-----+ 360
   Q F A C T V D T Y D N H R D I P R H R Q

361 GTCATGAACGAAGCCGCCACCGCAGCCGGCAACGTTGCACTGGTCTCTACCGGCTGGGAT
   -----+-----+-----+-----+-----+-----+ 420
   V M N E A A T A A G N V A L V S T G W D

421 CCAGGAATGTTCTCCATCAACCGCGTCTACGCAGCGGCAGTCTTAGCCGAGCACCAGCAG
   -----+-----+-----+-----+-----+-----+ 480
   P G M F S I N R V Y A A A V L A E H Q Q

481 CACACCTTCTGGGGCCAGGTTTGTACAGGGCCACTCCGATGCTTTGCGACGCATCCCT
   -----+-----+-----+-----+-----+-----+ 540
   H T F W G P G L S Q G H S D A L R R I P

```

FIG.11A

APPROVED	O.G. FIG.
BY	CLASS: SUBCLASS
DRAFTSMAN	

Sheet 16 of 36

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al.; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

```

GGCGTTCAAAAGGCcGTCCAGTACACCCTCCCATCCGAAGaGCCCTGGAAAAGGCCCGC
541 -----+-----+-----+-----+-----+-----+ 600
      G V Q K A V Q Y T L P S E E A L E K A R
      CGTGGCGAAGCCGGCGACCTcACCGGAAAGCAAACCCACAAGCGCCAATGCTTCGTGGTT
601 -----+-----+-----+-----+-----+-----+ 660
      R G E A G D L T G K Q T H K R Q C F V V
      GCCGACGCGGCCGAcCACGAGCGCATCGAAAACGACATCCGCACCATGCCTGATTACTTC
661 -----+-----+-----+-----+-----+-----+ 720
      A D A A D H E R I E N D I R T M P D Y F
      GTTGGCTACGAAGTCGAAGTCAACTTCATCGACGAAGCAACCTTgGACgCCGAGCACACC
721 -----+-----+-----+-----+-----+-----+ 780
      V G Y E V E V N F I D E A T L D A E H T
      GGCATGCCACACGGcGGaCACGTGATcACCACGGCGACACCGGTGGCTTCAACCACACC
781 -----+-----+-----+-----+-----+-----+ 840
      G M P H G G H V I T T G D T G G F N H T
      GTGGAATACATCCTgAAGCTGGACCGAAACCCAGATTTACCGCTTctTCACAGATCGCT
841 -----+-----+-----+-----+-----+-----+ 900
      V E Y I L K L D R N P D F T A S S Q I A
      TTCGGcCGCGCAGCTCACCGCATGAAGCAGCAGGGCCAAAGCGgtGCTTTACCGTCCTC
901 -----+-----+-----+-----+-----+-----+ 960
      F G R A A H R M K Q Q G Q S G A F T V L
      GAAGTTGCTCCATACtTGCTCTCCCCgGAGAACTTGGAtGATCTGATCGCACGCGACGTC
961 -----+-----+-----+-----+-----+-----+ 1020
      E V A P Y L L S P E N L D D L I A R D V
      TAA
1021 --- 1023

```

FIG.11B

APPROVED	O. G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

Sequence of full length LysA from NRRL B-11474 (SEQ ID NO: 11);
Underlined region: the priming site for lysA primer

ATGGCTACAGTTGAAAATTTCAATGAACTTCCCGCACACGTATGGCCACGCAATGCAGTG
CGCCAAGAAGACGGCGTTGTACCGTCGCTGGTGTGCCTCTGCCTGACCTCGCTGAAGAA
TACGGAACCCCACTGTTTCGTAGTCGACGAGGACGATTTCCGTTCCCGCTGTCGCGACATG
GCTACCGCATTTCGGTGGACCAGGCAATGTGCACTACGCATCCAAAGCGTTCCTGACCAAG
ACCATTGACGTTGGGTTGATGAAGAGGGGCTGGCACTGGACATTGCGTCCATCAATGAA
CTGGGCATTGCCCTGGCCGCTGGTTTCCCGGCCAGCCGTATCACCGCGCACGGCAACAAC
AAAGGCGTAGAGTTCCTGCGCGCGTTGGTTCAAACGGTGTGGGCATGTGGTGCTGGAC
TCCGCGCAGGAATTGGAAGTCTGGATTACGTTGCCGCTGGTGAAGGCAAGATCCAGGAC
GTGTTGATCCGCGTGAAGCCAGGTATCGAAGCCCACACCCACGAGTTCATCGCCACTAGC
CACGAAGACCAGAAGTTCGGATTCTCCCTGGCATCCGGTTCGCGATTTCGAAGCAGCGAAA
GCAGCCAACAATGCAGAGAACTTGAACCTGGTTGGTCTGCACTGCCATGTTGGTTCCAG
GTGTTGACGCCGAAGGCTTCAAGCTGGCAGCAGAGCGCGTGTGGGCCTGTACTCACAG
ATCCACAGCGAACTAGGTGTCGCCCTTCTGAGCTGGACCTCGGTGGCGGATACGGCATC
GCCTACACTGCAGATGAGGAACCACTCAACGTCGCAGAAGTCGCCTCCGACCTACTCACC
GCAGTCGGAAAAATGGCAGCGGAACTAGGCATCGACGCACCAACCGTGCTTGTGAGCCC
GGCCGCGCTATCGCAGGCCCTCCACCGTGACCATCTACGAAGTCGGCACCAACAAAAAC
GTCCACGTAGACGACGACAAAACCCGCCGTACGTAGCCGTCGACGGAGGCATGTCCGAC
AACATCCGCCCAGCACTCTACGGCTCCGAATACGACGCCCAGTAGTATCCCGCTTCGCC
GAAGGAGACCCAGTAAGCACCCGCATCGTGGGCTCCCACTGCGAATCCGGCGATATCCTG
ATCAACGATGAAATCTACCCATCTGACATCACCAGCGGCGACTTCTCGCACTCGCAGCC
ACCGGCGCATACTGCTACGCCATGAGTCCCGCTACAACGCCTTCACACGGCCCGCGTC
GTGTCCGTCCGCGCTGGCAGCTCCCGCTCATGCTGCGCCGCGAAACCTCGACGACATC
CTCTACTAGAGGCATAA

FIG.12

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

Sheet 18 of 36

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al. ; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Full length sequence of LysA (NRRL-B11474)
DIAMINOPIMELATE DECARBOXYLASE (Lys A) (SEQ ID NO:12)

MATVENFNELPAHVWPRNAVRQEDGVVTVAGVPLPDLAEEYGTPLFVVEDDFRSRCRDM
ATAFGGPGNVHYASKAFLTKTIARWVDEEGLALDIASINELGIALAAGFPASRITAHGNN
KGVEFLRALVQNGVGHVVLDSAQELELLDYVAAGEGKIQDVLIRVKPGIEAHTHEFIATS
HEDQKFGFSLASGSAFEAAKAANNAENLNLVGLHCHVGSQVFDAEGFKLAAERVLGLYSQ
IHSELGVALPELDLGGGYGIAYTADEEPLNVAEVASDLLTAVGKMAAELGIDAPTVLVEP
GRAIAGPSTVTIYEVGTTKNVHVDDDKTRRYVAVDGGMSDNIRPALYGSEYDARVVSRFA
EGDPVSTRIVGSHCESGDILINDEIYPSDITSGDFLALAATGAYCYAMSSRYNAFTRPV
VSVRAGSSRLMLRRETLDLILSLEA

FIG. 13

Sub
B21

APPROVED	O. G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al.; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Nucleotide sequence of AS019 lysA (SEQ ID NO:13) (pRS6)

```

1  ATGGCTACAG TTGAAAATTT CAATGAACTT CCCGCACACG TATGGCCACG
51  CAATGCCGTG CGCCAAGAAG ACGGCGTTGT CACCGTCGCT GGTGTGCCTC
101 TGCCTGACCT CGCTGAAGAA TACGGAACCC CACTGTTCGT AGTCGACGAG
151 GACGATTTCC GTTCCCCTG TCGCGACATG GCTACCGCAT TCGGTGGACC
201 AGGCAATGTG CACTACGCAT CTAAAGCGTT CCTGACCAAG ACCATTGCAC
251 GTTGGGTTGA TGAAGAGGGG CTGGCACTGG ACATTGCATC CATCAACGAA
301 CTGGGCATTG CCCTGGCCGC TGGTTTCCCC GCCAGCCGTA TCACCGCGCA
351 CGGCAACAAC AAAGGCGTAG AGTTCCTGCG CGCGTTGGTT CAAAACGGTG
401 TGGGACACGT GGTGCTGGAC TCCGCACAGG AACTAGAACT GTTGGATTAC
451 GTTGCCGCTG GTGAAGGCAA GATTCAGGAC GTGTTGATCC GCGTAAAGCC
501 AGGCATCGAA GCACACACCC ACGAGTTCAT CGCCACTAGC CACGAAGACC
551 AGAAGTTCGG ATTCTCCCTG GCATCCGGTT CCGCATTCGA AGCAGCAAAA
601 GCCGCCAACA ACGCAGAAAA CCTGAACCTG GTTGGCCTGC ACTGCCACGT
651 TGGTTCCCAG GTGTTTCGACG CCGAAGGCTT CAAGCTGGCA GCAGAACGCG
701 TGTTGGGCTT GTAATCACAG ATCCACAGCG AACTGGGCGT TGCCCTTCCT
751 GAACTGGATC TCGGTGGCGG ATACGGCATT GCCTATACCG CAGCTGAAGA
801 ACCACTCAAC GTCGCAGAAG TTGCCTCCGA CCTGCTCACC GCAGTCGGAA
851 AAATGGCAGC GGAAGTAGGC ATCGACGCAC CAACCGTGCT TGTTGAGCCC
901 GGCCGCGCTA TCGCAGGCCC CTCCACCGTG ACCATCTACG AAGTCGGCAC
951 CACCAAAGAC GTCCACGTAG ACGACGACAA AACC CGCCGT TACATCGCCG
1001 TGGACGGAGG CATGTCCGAC AACATCCGCC CAGCACTCTA CGGCTCCGAA
1051 TACGACGCCC GCGTAGTATC CCGCTTCGCC GAAGGAGACC CAGTAAGCAC
1101 CCGCATCGTG GGCTCCCACT GCGAATCCGG CGATATCCTG ATCAACGATG
1151 AAATCTACCC ATCTGACATC ACCAGCGGCG ACTTCCTTGC ACTCGCAGCC
1201 ACCGGCGCAT ACTGCTACGC CATGAGCTCC CGCTACAACG CCTTCACACG
1251 GCCCGCCGTC GTGTCCGTCC GCGCTGGCAG CTCCCGCCTC ATGCTGCGCC
1301 GCGAAACGCT CGACGACATC CTCTCACTAG AGGCATAA

```

FIG.14

APPROVED	O.G. FIG.
BY	CLASS: SUBCLASS
DRAFTSMAN	

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al.; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Full length amino acid sequence of lysA (pRS6)(SEQ ID NO:14)

```

ATGGCTACAGTTGAAAATTTCAATGAACTTCCCGCACACGTATGGCCACGCAATGCCGTG
1  -----+-----+-----+-----+-----+-----+ 60
M A T V E N F N E L P A H V W P R N A V

CGCCAAGAAGACGGCGTTGTCACCGTCGCTGGTGTGCCTCTGCCTGACCTCGCTGAAGAA
61  -----+-----+-----+-----+-----+-----+ 120
R Q E D G V V T V A G V P L P D L A E E

TACGGAACCCCACTGTTTCGTAGTCGACGAGGACGATTTCCGTTCCCGCTGTCGCGACATG
121 -----+-----+-----+-----+-----+-----+ 180
Y G T P L F V V D E D D F R S R C R D M

GCTACCGCATTCGGTGGACCAGGCAATGTGCACTACGCATCTAAAGCGTTCCTGACCAAG
181 -----+-----+-----+-----+-----+-----+ 240
A T A F G G P G N V H Y A S K A F L T K

ACCATTGCACGTTGGGTTGATGAAGAGGGGCTGGCACTGGACATTGCATCCATCAACGAA
241 -----+-----+-----+-----+-----+-----+ 300
T I A R W V D E E G L A L D I A S I N E

CTGGGCATTGCCCTGGCCGCTGGTTTCCCGCCAGCCGTATCACCGCGCACGGCAACAAC
301 -----+-----+-----+-----+-----+-----+ 360
L G I A L A A G F P A S R I T A H G N N

AAAGGCGTAGAGTTCCTGCGCGCGTTGGTTCAAAACGGTGTGGGACACGTGGTGCTGGAC
361 -----+-----+-----+-----+-----+-----+ 420
K G V E F L R A L V Q N G V G H V V L D

TCCGCACAGGAAGTAGAACTGTTGGATTACGTTGCCGCTGGTGAAGGCAAGATTCAGGAC
421 -----+-----+-----+-----+-----+-----+ 480
S A Q E L E L L D Y V A A G E G K I Q D

```

FIG.15A

APPROVED	G.G. FIG.	
.BY	CLASS	SUBCLASS
DRAFTSMAN		

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al. ; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

```

GTGTTGATCCGCGTAAAGCCAGGCATCGAAGCACACACCCACGAGTTCATCGCCACTAGC
481 -----+-----+-----+-----+-----+-----+ 540

V L I R V K P G I E A H T H E F I A T S

CACGAAGACCAGAAGTTCGGATTCTCCCTGGCATCCGGTTCGCGATTCTGAAGCAGCAAAA
541 -----+-----+-----+-----+-----+-----+ 600

H E D Q K F G F S L A S G S A F E A A K

GCCGCCAACAAACGCAGAAAACCTGAACCTGGTTGGCCTGCACTGCCACGTTGGTTCCCAG
601 -----+-----+-----+-----+-----+-----+ 660

A A N N A E N L N L V G L H C H V G S Q

GTGTTGACGCCGAAGGCTTCAAGCTGGCAGCAGAACGCGTGTGGGCCTGTACTCACAG
661 -----+-----+-----+-----+-----+-----+ 720

V F D A E G F K L A A E R V L G L Y S Q

ATCCACAGCGAACTGGGCGTTGCCCTTCTGAACTGGATCTCGGTGGCGGATACGGCATT
721 -----+-----+-----+-----+-----+-----+ 780

I H S E L G V A L P E L D L G G G Y G I

GCCTATACCGCAGCTGAAGAACCACTCAACGTCGAGAAAGTTGCCTCCGACCTGCTCACC
781 -----+-----+-----+-----+-----+-----+ 840

A Y T A A E E P L N V A E V A S D L L T

GCAGTCGGA AAAAATGGCAGCGGAACTAGGCATCGACGCACCAACCGTGCTTGTTGAGCCC
841 -----+-----+-----+-----+-----+-----+ 900

A V G K M A A E L G I D A P T V L V E P

GGCCGCGCTATCGCAGGCCCTCCACCGTGACCATCTACGAAGTCGGCACCACCAAAGAC
901 -----+-----+-----+-----+-----+-----+ 960

G R A I A G P S T V T I Y E V G T T K D

```

FIG.15B

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al. ; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

```

          GTCCACGTAGACGACGACAAAACCCGCCGTTACATCGCCGTGGACGGAGGCATGTCCGAC
961  -----+-----+-----+-----+-----+-----+ 1020

          V H V D D D K T R R Y I A V D G G M S D

          AACATCCGCCCAGCACTCTACGGCTCCGAATACGACGCCCGCGTAGTATCCCGCTTCGCC
1021 -----+-----+-----+-----+-----+-----+ 1080

          N I R P A L Y G S E Y D A R V V S R F A

          GAAGGAGACCCAGTAAGCACCCGCATCGTGGGCTCCCACTGCGAATCCGGCGATATCCTG
1081 -----+-----+-----+-----+-----+-----+ 1140

          E G D P V S T R I V G S H C E S G D I L

          ATCAACGATGAAATCTACCCATCTGACATCACCAGCGGCGACTTCCTTGCACTCGCAGCC
1141 -----+-----+-----+-----+-----+-----+ 1200

          I N D E I Y P S D I T S G D F L A L A A

          ACCGGCGCATACTGCTACGCCATGAGCTCCCGCTACAACGCCTTCACACGGCCCCGCCGTC
1201 -----+-----+-----+-----+-----+-----+ 1260

          T G A Y C Y A M S S R Y N A F T R P A V

          GTGTCCGTCCGCGCTGGCAGCTCCCGCCTCATGCTGCGCCGCGAAACGCTCGACGACATC
1261 -----+-----+-----+-----+-----+-----+ 1320

          V S V R A G S S R L M L R R E T L D D I

          CTCTCACTAGAGGCATAA
1321 -----+----- 1338

          L S L E A *

```

FIG.15C

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al. ; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Nucleotide sequence of orf2 in dapBA operon (SEQ ID NO:15)

```

1  GTGGCCGAAC AAGTTAAATT GAGCGTGGAG TTGATAGCGT GCAGTTCTTT
51  TACTCCACCC GCTGATGTTG AGTGGTCAAC TGATGTTGAG GGC GCGGAAG
101 CACTCGTCGA GTTTGCGGGT CGTGCCTGCT ACGAAACTTT TGATAAGCCG
151 AACCTCGAA CTGCTTCCAA TGCTGCGTAT CTGCGCCACA TCATGGAAGT
201 GGGGCACACT GCTTTGCTTG AGCATGCCAA TGCCACGATG TATATCCGAG
251 GCATTTCTCG GTCCGCGACC CATGAATTGG TCCGACACCG CCATTTTTC
301 TTCTCTCAAC TGTCTCAGCG TTTCGTGCAC AGCGGAGAAT CGGAAGTAGT
351 GGTGCCCCACT CTCATCGATG AAGATCCGCA GTTGCGTGAA CTTTTCATGC
401 ACGCCATGGA TGAGTCTCGG TTCGCTTTCA ATGAGCTGCT TAATGCGCTG
451 GAAGAAAAAC TTGGCGATGA ACCGAATGCA CTTTAAAGGA AAAAGCAGGC
501 TCGTCAAGCA GCTCGCGCTG TGCTGCCCAA CGCTACAGAG TCCAGAATCG
551 TGGTGTCTGG AAAC TTCCGC ACCTGGAGGC ATTTCATTGG CATGCGAGCC
601 AGTGAACATG CAGACGTCGA AATCCGCGAA GTAGCGGTAG GATGTTTAAG
651 AAAGCTGCAG GTAGCAGCGC CAACTGTTTT CGGTGATTTT GAGATTGAAA
701 CTTTGGCAGA CGGATCGCAA ATGGCAACAA GCCCGTATGT CATGGACTTT
751 TAA

```

FIG. 16

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al.; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

ORF2 amino acid sequence (SEQ ID NO:16)

```

GTGGCCGAACAAGTTAAATTGAGCGTGGAGTTGATAGCGTGCAGTTCTTTTACTCCACCC
1  -----+-----+-----+-----+-----+-----+ 60
M A E Q V K L S V E L I A C S S F T P P

GCTGATGTTGAGTGGTCAACTGATGTTGAGGGCGCGGAAGCACTCGTCGAGTTTGCGGGT
61  -----+-----+-----+-----+-----+-----+ 120
A D V E W S T D V E G A E A L V E F A G

CGTGCCTGCTACGAACTTTTGATAAGCCGAACCCTCGAACTGCTTCCAATGCTGCGTAT
121 -----+-----+-----+-----+-----+-----+ 180
R A C Y E T F D K P N P R T A S N A A Y

CTGCGCCACATCATGGAAGTGGGGCACACTGCTTTGCTTGAGCATGCCAATGCCACGATG
181 -----+-----+-----+-----+-----+-----+ 240
L R H I M E V G H T A L L E H A N A T M

TATATCCGAGGCATTTCTCGGTCCGCGACCCATGAATTGGTCCGACACCGCCATTTTTC
241 -----+-----+-----+-----+-----+-----+ 300
Y I R G I S R S A T H E L V R H R H F S

TTCTCTCAACTGTCTCAGCGTTTCGTGCACAGCGGAGAATCGGAAGTAGTGGTGCCCACT
301 -----+-----+-----+-----+-----+-----+ 360
F S Q L S Q R F V H S G E S E V V V P T

CTCATCGATGAAGATCCGCAGTTGCGTGAACCTTTTCATGCACGCCATGGATGAGTCTCGG
361 -----+-----+-----+-----+-----+-----+ 420
L I D E D P Q L R E L F M H A M D E S R

```

FIG.17A

APPROVED	O.G. FIG.
BY	CLASS SUBCLASS
DRAFTSMAN	

Sheet 25 of 36

Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al. ; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

```

TTCGCTTTCAATGAGCTGCTTAATGCGCTGGAAGAAAACTTGGCGATGAACCGAATGCA
421 -----+-----+-----+-----+-----+-----+ 480

F A F N E L L N A L E E K L G D E P N A

CTTTTAAGGAAAAAGCAGGCTCGTCAAGCAGCTCGCGCTGTGCTGCCCAACGCTACAGAG
481 -----+-----+-----+-----+-----+-----+ 540

L L R K K Q A R Q A A R A V L P N A T E

TCCAGAATCGTGGTGTCTGGAACTTCCGCACCTGGAGGCATTTTCATTGGCATGCGAGCC
541 -----+-----+-----+-----+-----+-----+ 600

S R I V V S G N F R T W R H F I G M R A

AGTGAACATGCAGACGTCGAAATCCGCGAAGTAGCGGTAGGATGTTTAAGAAAGCTGCAG
601 -----+-----+-----+-----+-----+-----+ 660

S E H A D V E I R E V A V G C L R K L Q

GTAGCAGCGCCAACTGTTTTCGGTGATTTTGAGATTGAACTTTGGCAGACGGATCGCAA
661 -----+-----+-----+-----+-----+-----+ 720

V A A P T V F G D F E I E T L A D G S Q

ATGGCAACAAGCCCGTATGTCATGGACTTTTAA
721 -----+-----+-----+-----+-----+ 753

M A T S P Y V M D F *

```

FIG. 17B

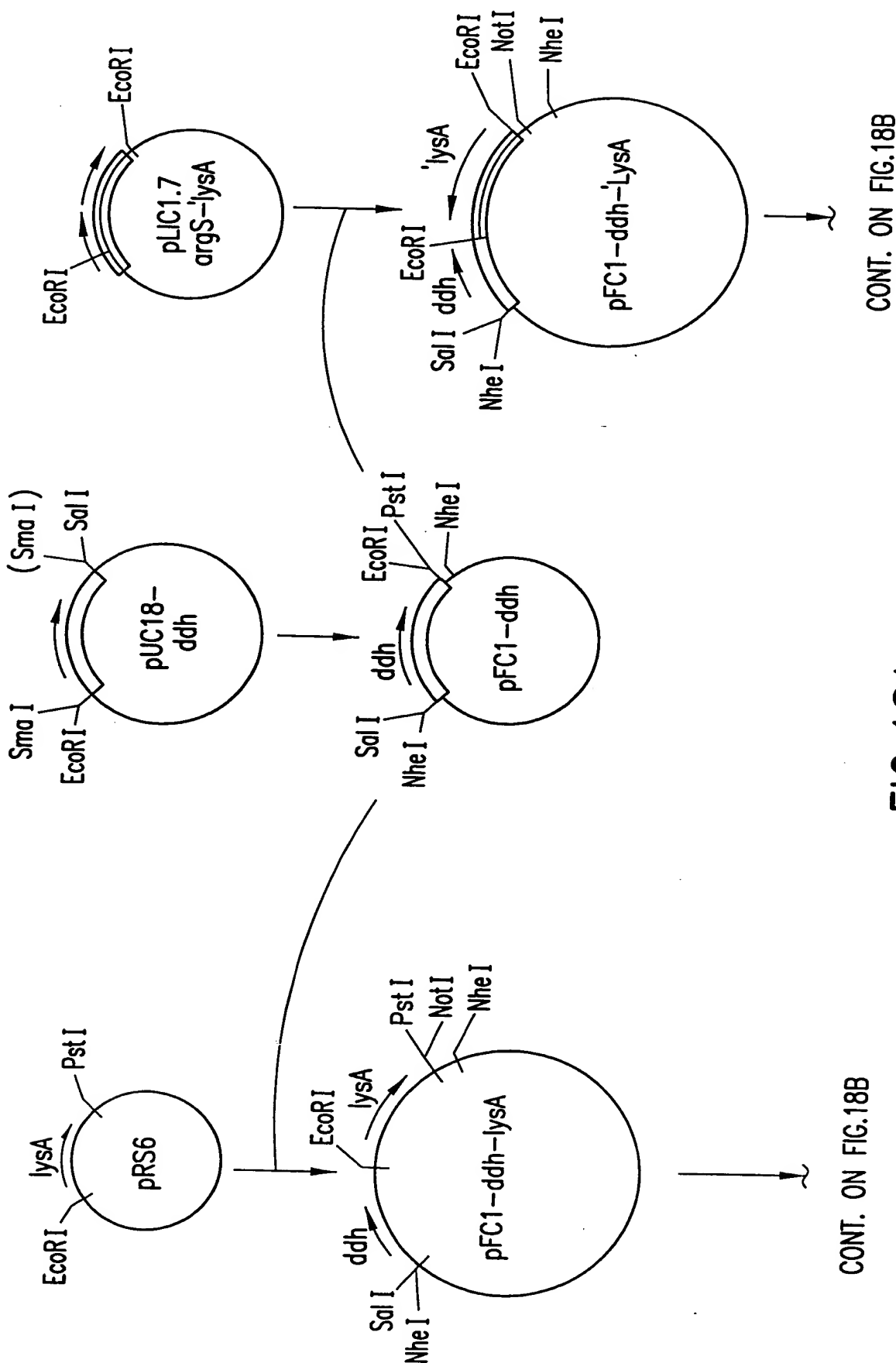


FIG. 18A

CONT. ON FIG. 18B

CONT. ON FIG. 18B

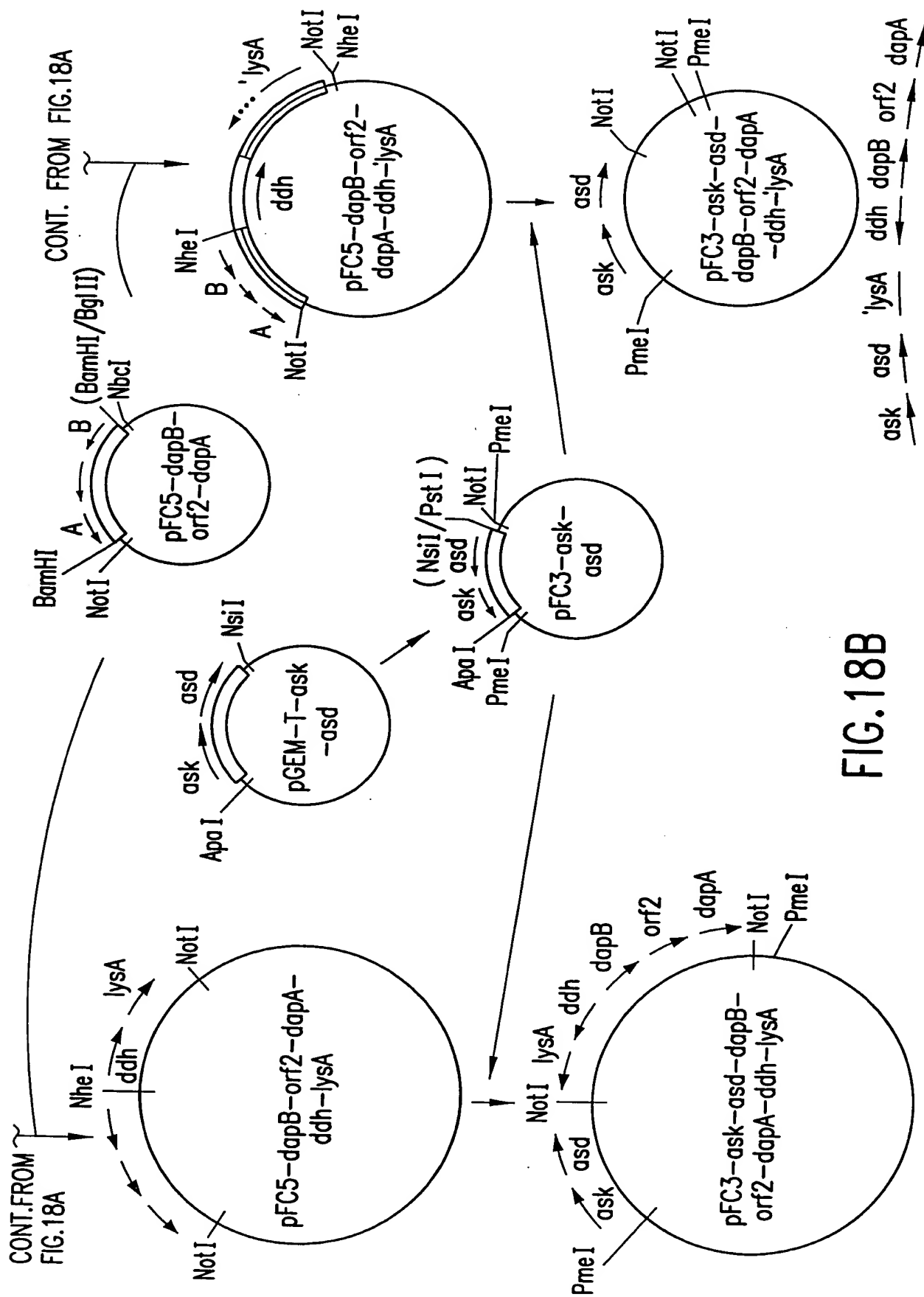


FIG.18B

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
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Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al.; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

	1		50
ATCC 13032			
N13		V	
ATCC 21529		C	
Consensus	MALVVQKYGG SSLESAERIR NVAERIVATK KAGNDVVVVC	C	SAMGDTTDEL
	51		100
ATCC 13032			
N13			
ATCC 21529			
Consensus	LELAAAVNPV PPAREMDMLL TAGERISNAL VAMAIESLGA		EAQSFTGSQA
	101		150
ATCC 13032			
N13			
ATCC 21529			
Consensus	GVLTERHGN ARIVDVTPGR VREALDEGKI CIVAGFQGVN		KETRDVTTLG
	151		200
ATCC 13032			
N13			
ATCC 21529			
Consensus	RGGSDDTAVA LAAALNADVC EIYSDVDGVY TADPRIVPNA		QKLEKLSFEE
	201		250
ATCC 13032			
N13			
ATCC 21529			
Consensus	MLELAAVGSK ILVLR SVEYA RAFNVPLRVR SSYSNDPGTL		IAGSMEDIPV
	251		300
ATCC 13032			
N13			
ATCC 21529			
Consensus	EEAVLTGVAT DKSEAKVTVL GISDKPGEEA KVFRALADAE		INIDMVLQNV
	301		350
ATCC 13032		S	G
N13		A	D
ATCC 21529		A	G
Consensus	SSVEDGTTDI TFTCPRADGR RAMEILKKLQ VQGNWTVLY		DDQVGKVS LV
	351		400
ATCC 13032		T	
N13		T	
ATCC 21529		I	
Consensus	GAGMKSHPGV TAEFMEALRD VNVNIELIST SEIRISVLIR		EDDLAAARA
	401	421	
ATCC 13032			
N13			
ATCC 21529			
Consensus	LHEQFLGGE DEAVVYAGTG		R

FIG.19

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
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Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al. ; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

HpaI-PvuII fragment comprising the P1 promoter (SEQ ID NO:17)

AACCGGTGTGGAGCCGACCATTCCGCGAGGCTGCACTGCAACGAGGTCGTAGTTTTGGTACATGGCTTCTG
GCCAGTTCATGGATTGGCTGCCGAAGAAGCTATAGGCATCGCCACCAGGGCCACCGGAGTTACCGAAGATG
GTGCCGTGCTTTTCGCCTTGGGCAGGGACCTTGACAAAGCCCACGCTGATATCGCCAAGTGAGGGATCAGA
ATAGTGATGGGCACGTCGATGCTGCCACATTGAGCGGAGGCAATATCTACCTGAGGTGGGCATTCTTCCC
AGCGGATGTTTTCTTGCGCTGCTGCAGTGGGCATTGATACCAAAAAGGGGCTAAGCGCAGTCGAGGCGGCA
AGAACTGCTACTACCTTTTTTATTGTGCAACGGGGCATTACGGCTCCAAGGACGTTTGTCTTCTGGGTCAG
TTACCCCAAAAAGCATATACAGAGACCAATGATTTTTTCATTAAAAAGGCAGGGATTGTATAAGTATGGG
TCGTATTCTGTGCGACGGGTGTACCTCGGCTAGAATTTCTCCCATGACACCAG

FIG. 20

MAKING pFC1-ddh P1lysA

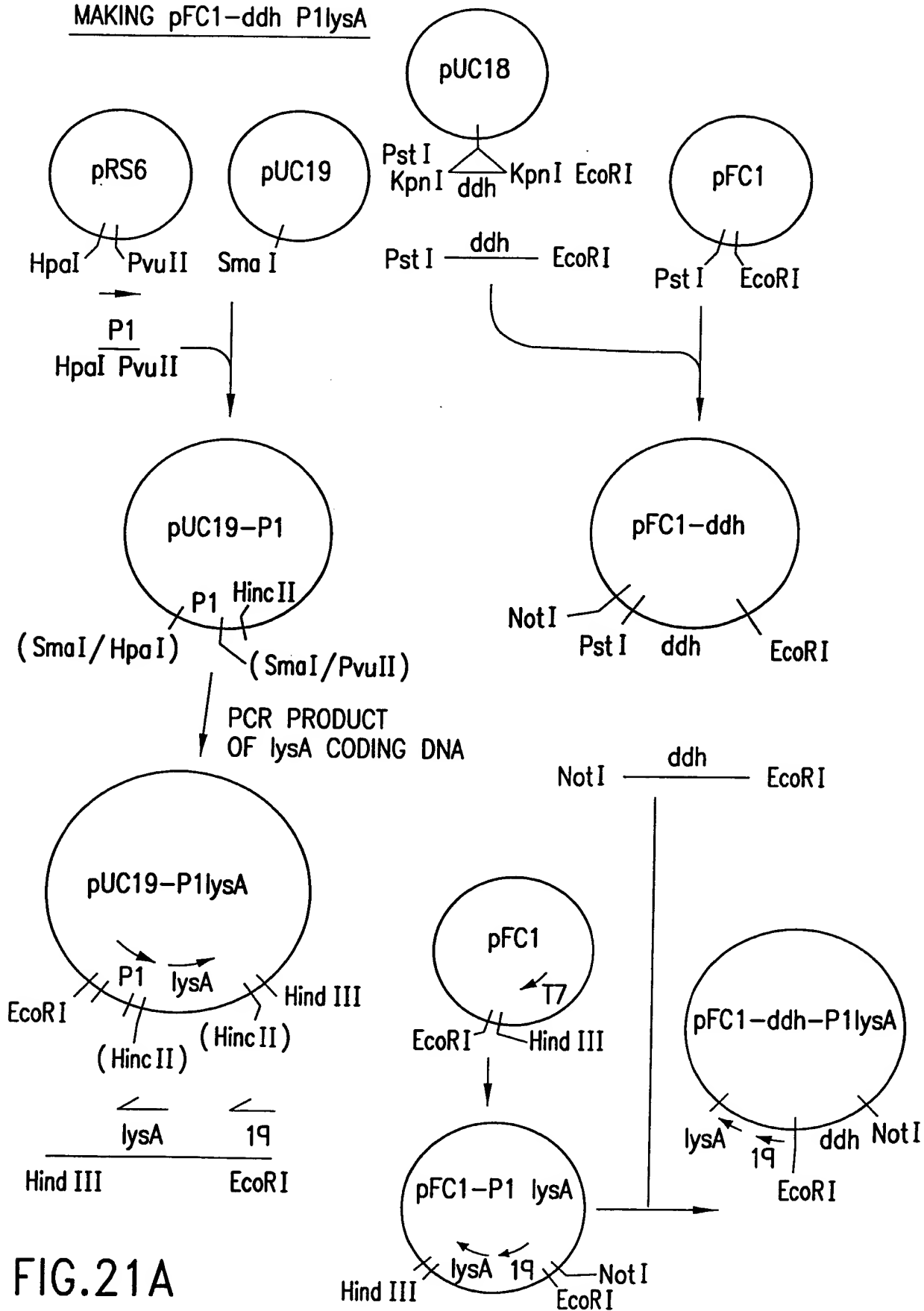


FIG.21A

MAKING pDElia2-KDABHP1L

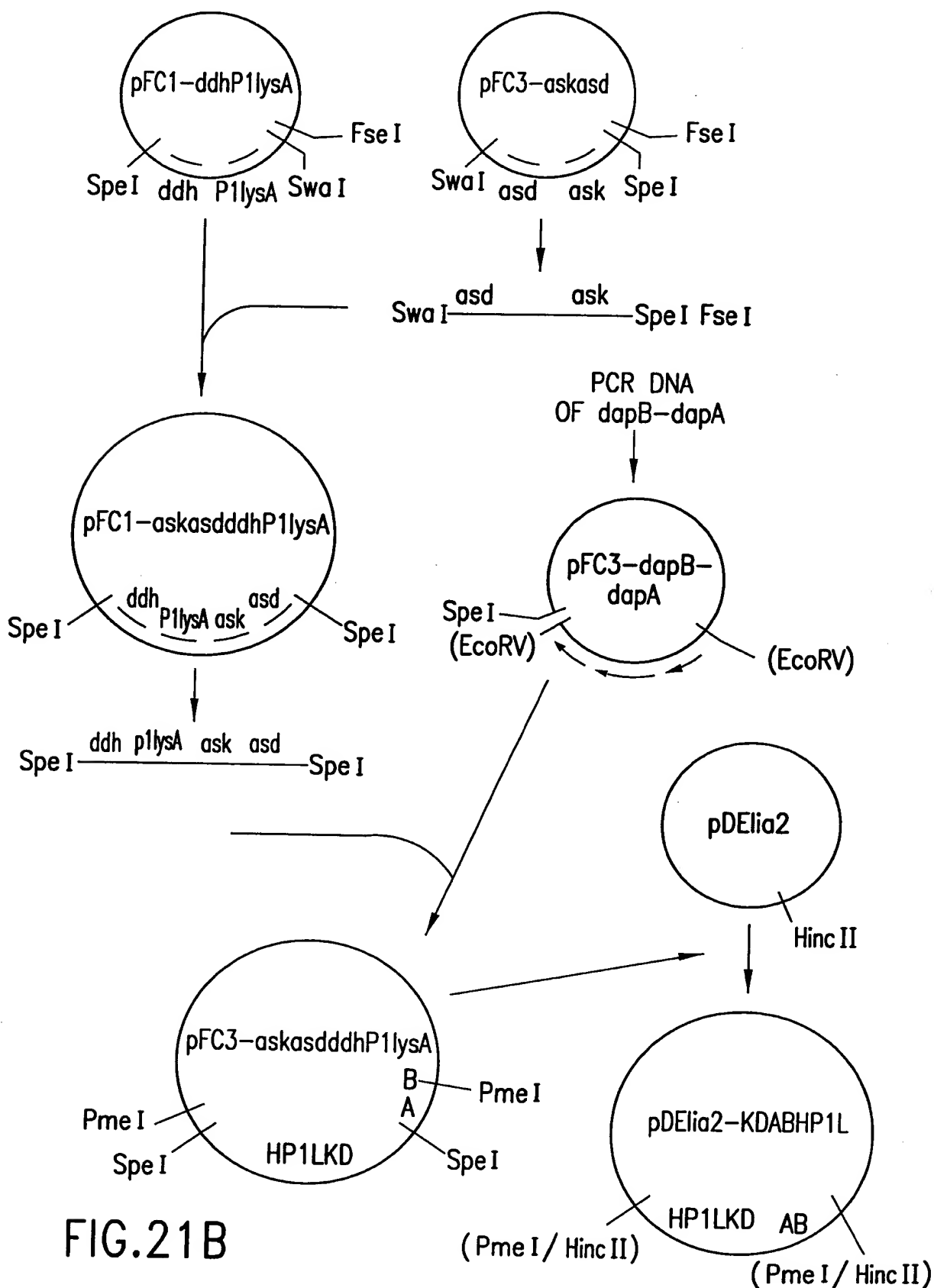


FIG.21B

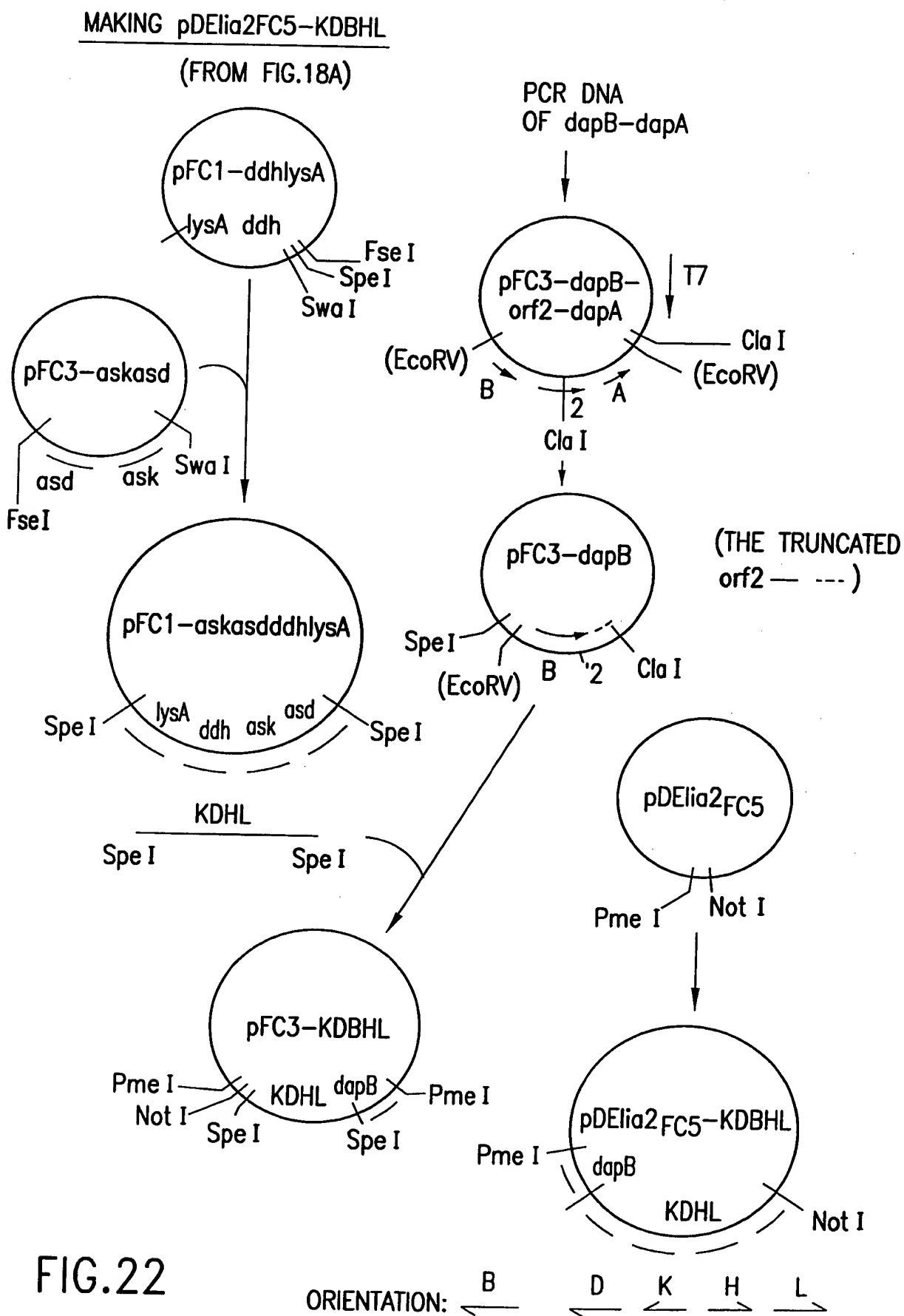


FIG.22

APPROVED	10.3. FIG.
BY	CLASS. SUBCLAS.
DRAFTSMAN	

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Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al. ; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Nucleotide sequence of truncated ORF2 (SEQ ID NO:18)

```
1  GTGGCCGAAC AAGTTAAATT GAGCGTGGAG TTGATAGCGT GCAGTTCCTT
51  TACTCCACCC GCTGATGTTG AGTGGTCAAC TGATGTTGAG GGCGCGGAAG
101 CACTCGTCGA GTTTGCGGGT CGTGCCTGCT ACGAAACTTT TGATAAGCCG
151 AACCCTCGAA CTGCTTCCAA TGCTGCGTAT CTGCGCCACA TCATGGAAGT
201 GGGGCACACT GCTTTGCTTG AGCATGCCAA TGCCACGATG TATATCCGAG
251 GCATTTCTCG GTCCGCGACC CATGAATTGG TCCGACACCG CCATTTTCC
301 TTCTCTCAAC TGTCTCAGCG TTTCGTGCAC AGCGGAGAAT CGGAAGTAGT
351 GGTGCCCCACT CTCAT
```

FIG. 23

APPROVED	O.G. FIG.	
BY	CLASS	SUBCLASS
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Truncated ORF2 amino acid sequence (SEQ ID NO:19)

```

GTGGCCGAACAAGTTAAATTGAGCGTGGAGTTGATAGCGTGCAAGTTCTTTTACTCCACCC
1  -----+-----+-----+-----+-----+-----+ 60
  M A E Q V K L S V E L I A C S S F T P P

GCTGATGTTGAGTGGTCAACTGATGTTGAGGGCGCGGAAGCACTCGTCGAGTTTGCGGGT
61  -----+-----+-----+-----+-----+-----+ 120
  A D V E W S T D V E G A E A L V E F A G

CGTGCCTGCTACGAACTTTTGATAAGCCGAACCCTCGAACTGCTTCCAATGCTGCGTAT
121 -----+-----+-----+-----+-----+-----+ 180
  R A C Y E T F D K P N P R T A S N A A Y

CTGCGCCACATCATGGAAGTGGGGCACACTGCTTTGCTTGAGCATGCCAATGCCACGATG
181 -----+-----+-----+-----+-----+-----+ 240
  L R H I M E V G H T A L L E H A N A T M

TATATCCGAGGCATTTCTCGGTCCGCGACCCATGAATTGGTCCGACACCGCCATTTTCC
241 -----+-----+-----+-----+-----+-----+ 300
  Y I R G I S R S A T H E L V R H R H F S

TTCTCTCAACTGTCTCAGCGTTTCGTGCACAGCGGAGAATCGGAAGTAGTGGTGCCCACT
301 -----+-----+-----+-----+-----+-----+ 360
  F S Q L S Q R F V H S G E S E V V V P T

CTCAT ...
361 -----
  L (I)

```

FIG. 24

APPROVED	C. G. F. G.	
BY	CLASS	SUBCLASS
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Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al. ; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Sequence of truncated LysA ('LysA) (NRRL-B11474) (SEQ ID NO:20)

ATGGCTACAGTTGAAAATTTCAATGAACTTCCCGCACACGTATGGCCACGCAATGCAGTG
CGCCAAGAAGACGGCGTTGTACCGTTCGCTGGTGTGCCTCTGCCTGACCTCGCTGAAGAA
TACGGAACCCCACTGTTCTAGTCGACGAGGACGATTTCCGTTCCCGCTGTCGCGACATG
GCTACCGCATTCTGGTGGACAGGCAATGTGCACTACGCATCAAAGCGTTCCTGACCAAG
ACCATTCACGTTGGGTTGATGAAGAGGGGCTGGCACTGGACATTGCGTCCATCAATGAA
CTGGGCATTGCCCTGGCCGCTGGTTTTCCCGGCCAGCCGTATCACCGCGCACGGCAACAAC
AAAGGCGTAGAGTTCCTGCGCGCGTTGGTTCAAAACGGTGTGCGGCATGTGGTGCTGGAC
TCCGCGCAGGAATTGGAAGTCTGGATTACGTTGCCGCTGGTGAAGGCAAGATCCAGGAC
GTGTTGATCCGCGTGAAGCCAGGTATCGAAGCCCACACCCACGAGTTCATCGCCACTAGC
CACGAAGACCAGAAGTTCGGATTCTCCCTGGCATCCGGTTCGCGATTCTGAAGCAGCGAAA
GCAGCCAACAATGCAGAGAACTTGAACCTGGTTGGTCTGCACTGCCATGTTGGTTCCCAG
GTGTTTCGACGCCGAAGGCTTCAAGCTGGCAGCAGAGCGCGTGTGGGCCTGTACTCACAG
ATCCACAGCGAACTAGGTGTGCGCCCTTCTGAGCTGGACCTCGGTGGCGGATACGGCATC
GCCTACACTGCAGATGAGGAACCACTCAACGTCGCAGAAGTCGCCTCCGACCT

FIG. 25

APPROVED	C.G. FIG.
BY	CLASS/SUBCLASS
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Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al. ; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Truncated sequence of LysA (NRRL-B11474)

DIAMINOPIMELATE DECARBOXYLASE (LysA) (SEQ ID NO:21)

MATVENFNELPAHVWPRNAVRQEDGVVTVAGVPLPDLAEEYGTPLFVVDEDDFRSRCRDM
ATAFGGPGNVHYASKAFLTKTIARWVDEEGLALDIASINELGIALAAGFPASRITAHGNN
KGVEFLRALVQNGVGHVVLDSAQELELLDYVAAGEGKIQDVLIRVKPGIEAHTHEFIATS
HEDQKFGFSLASGSAFEAAKAANNAENLNLVGLHCHVGSQVFDAEGFKLAAERVLGLYSQ
IHSELGVALPELDLGGGYGIAYTADEEPLNVAEVASDL

FIG. 26